AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Figures 5 and 6. Figures 5 and 6 have been designated with the legend "Prior Art."

Attachment: Replacement sheet

REMARKS

The application has been reviewed in light of the Office Action mailed January 10, 2005. Claims 1, 9 and 17 have been amended without adding new matter. Reconsideration of the application is respectfully requested in light of the following.

The drawings are objected to because, according to the Office Action, Figures 5 and 6 should be designated by a legend such as "Prior Art." As requested, Applicants are submitting herewith a Replacement Sheet containing Figures 5 and 6, wherein said Figures have been designated with the legend "Prior Art."

Claims 1-7, 17 and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Muller et al., U.S. Patent No. 4,211,924 ("Muller"). Reconsideration is respectfully requested in light of the foregoing amendments and the following remarks.

The invention relates to charged particle beam device. According to an embodiment of the invention, as shown in Figure 2, for example, a transmitted signal conversion member 15, with a through hole, is disposed under the thin film sample 14 in order to detect the dark field transmitted signal particles. Bright field signal particles 18a transmitted through the sample 14, without being scattered within the sample, pass through this through hole and are detected by the transmitted signal detector 17. The bright field signal detected by the transmitted signal detector 17 generates a bright field signal image, as shown in Figure 3B, for example.

Dark field signal particles 18b, scattered within and transmitted through the sample, collide against the transmitted signal conversion member 15 to emit secondary signal particles 12. The secondary signal particles 12 are detected by the secondary signal detector 13 disposed below the objective lens 20. The dark field signal detected by a secondary signal detector 13 generates a dark field signal image, as shown in Figure 3C, for example.

On the other hand, the secondary signal particles 11 emitted from the surface of the sample are deflected, by an orthogonal electromagnetic field generator 22 placed above an

objective lens 20, toward a secondary signal detector 9, which detects the secondary signal particles 11. The secondary signal detected by the secondary signal detector 9 generates a secondary signal image, as shown in Figure 3A, for example.

According to an important feature of the present invention, a magnetic distribution 200 of a magnetic field leaked from the objective lens 20 is formed such that the intensity of a focusing magnetic field at the position of the sample 14 is stronger than at the position of the transmitted signal conversion member 15. The secondary signal particles 11 emitted from the surface of the sample are converged strongly by the leaked magnetic field to advance toward the source of the charged particles (above the objective lens 20). Therefore, the secondary signal detector 13, placed below the objective lens 20, will not substantially detect the secondary signal particles 11. The secondary signal detector 13 can detect only the secondary signal particles 12, with the desirable result of attaining high-contrast and high-resolution dark field STEM images. The invention is not limited to the disclosed embodiments.

Claim 1 has been amended to further distinguish over the cited reference. Claim 1 recites a "charged particle beam device having a source of charged particles, and a charged particle optical system ... comprising: a transmitted signal conversion member ... and an opening ... through which the charged particles scattered within and transmitted through the sample can pass." Further, claim 1 has been amended to recite an "<u>objective lens which is configured to leak a magnetic field toward the sample positioned below said objective lens and to form a focusing magnetic field such that an intensity of the focusing magnetic field at a position of the sample is stronger than at a position of said transmitted signal conversion member</u>."

Muller fails to teach or suggest these limitations. Muller discloses a transmission type scanning charged particle beam microscope comprising an objective lens 3, transparent fluorescent screen 11 and specimen 4, as shown in Figure 1. Muller discloses another embodiment comprising an objective lens 3, transparent fluorescent screen 11, deflection mirror 25 and specimen 4, as shown in Figure 2. The fluorescent screen 11 and deflection mirror 25

each have an aperture. Therefore, it is possible to perform an energy analysis as well as to simultaneously display the diffraction image and the dark-field image.

Importantly, however, Muller does not teach or suggest a magnetic distribution of a magnetic field leaked from an objective lens. For at least this reason, amended claim 1 is allowable over Muller. Claims 2-4 depend from claim 1 and contain every limitation of claim 1, and should be allowed together with their base claim.

Similarly, claim 17 has been amended to recite an "an objective lens which is configured to leak a magnetic field toward the sample positioned below said objective lens and to form a focusing magnetic field such that an intensity of the focusing magnetic field at a position of the sample is stronger than at a position of said transmitted signal conversion member." Claim 17 is allowable for the same reasons as discussed above with respect to claim 1. Claim 18 depends from claim 17, and is also allowable.

Claim 5 has been amended to recite "<u>an aperture for obstructing part of the transmitted signal particles</u>." Muller fails to teach or suggest this feature. The Office Action asserts the Muller teaches "an aperture (29) for obstructing part of the transmitted signal particles reaching said ... detection means." However, element 29 in Muller is a slit that is located downstream of the energy analyzer 28. Thus, slit 29 does not obstruct any particles from reaching the energy analyzer 28, and cannot be compared to the claimed "<u>aperture for obstructing part of the transmitted signal particles</u>." For at least this reason, amended claim 5 is allowable. Claims 6 and 7 depend from claim 5 and should be allowed together with their base claim.

Claims 8 and 9 stand rejected under 35 U.S.C. 103 as being unpatentable over Muller in view of Koike et al., U.S. Patent No. 3,717,761 ("Koike"). This rejection is respectfully traversed for the following reasons.

Claim 8 depends from claim 1 and contains every limitation of claim 1. As discussed above, amended claim 1 is allowable over Muller, and Koike adds nothing to Muller to remedy its deficiencies with respect to claim 1. Thus, claim 8 is allowable. Claim

9 has been amended to recite an "objective lens which is configured to leak a magnetic field toward the sample positioned below said objective lens and to form a focusing magnetic field such that an intensity of the focusing magnetic field at a position of the sample is stronger than at a position of said transmitted signal conversion member." As discussed in greater detail below, Muller and Koike, taken alone or in combination, fail to teach or suggest the limitations of amended claim 9, and claim 9 is allowable.

Koike discloses a scanning electron microscope comprising an electron lens 7, the pre-field of which extends to an upper part of a deflection means 5. In Koike, the secondary electrons are spirally focused along the electron optical axis in the upper direction. The scanning electron microscope of Koike does not have an objective lens that leaks a magnetic field toward a sample positioned below the objective lens. And, Koike does not teach or suggest a relationship between a transmitted signal conversion member, objective lens and the sample as recited in amended claim 1.

Even if properly combinable, the electron lens 7 of Koike and the fluorescent screen 11 of Muller do not teach or suggest the features and effects of the present invention cannot be obtained. It is assumed that the electron lens 7 of Koike would be positioned along the magnetic axis of microscope of Muller, in Figure 1. However, if the fluorescent screen 11 of Muller is positioned outside of the magnetic field of the electron lens 7, the secondary particles emitted from the sample as well as the secondary electrons emitted from the fluorescent screen 11 are focused and, therefore, the secondary electrons emitted from the fluorescent screen 11 cannot be detected by the scintillation detector 18.

If the fluorescent screen 11 of Muller is positioned inside of the magnetic field of the electron lens 7, it is difficult to position the fluorescent screen 11 near the sample. It is preferable that the detector (the fluorescent screen 11) is positioned as near the sample as possible in order to detect the electrons passing through the sample and scattered to a wide angle. However, since the lower magnetic pole of the electron lens 7 is positioned below the focusing magnetic field produced by the electron lens 7, it is difficult to position the fluorescent screen 11 near the sample.

According to the present invention, the magnetic distribution 200 of the magnetic field leaked from objective lens 20 is formed so as to direct the secondary signal particles 11 emitted from the sample toward the source of charged particles (above the objective lens 20). Therefore, the secondary signal detector 13 will not substantially detect the secondary signal particles 11 and can detect only the secondary signal particles 12. Thus, the features of the present invention cannot be obtained by Koike and Muller, taken alone or in combination.

Applicants note with appreciation the indication that claims 10-16 are allowed, and that claims 19 and 20 would be allowable if rewritten in independent form. However, in view of the above amendments and remarks, Applicants believe that the pending application is in condition for allowance.

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Respectfully submitted,

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Attachments